

NIR-Online®

NIR spectroscopy and its fields of application

Near infra-red spectroscopy can be used in a multitude of ways; in order to give you some idea of the capacity and versatility which NIR spectroscopy has to offer, we have listed some examples of how this technology can be applied in a range specialist fields.

Should something similar to your own particular field be amongst these examples, NIR spectroscopy could be the ideal technology for you. Even if you don't find anything here - simply ask us whether NIR spectroscopy would be suitable for you.

We have experience in the most diverse fields:

- Pharmaceuticals
- Mills
- Malt houses and breweries
- Agriculture
- Animal feed
- Petrochemicals
- Polymer analysis
- The chemical industry
- The woodworking industry
- Other branches of industry

Pharmaceuticals

In the pharmaceutical industry, NIR spectroscopy has been used for identity control of, for example, incoming raw materials, for quite some time. With growing acceptance amongst the pharmacopoeia, emphasis is increasingly being placed on more frequent quantitative regulation.

This includes processes for analysing active ingredients, secondary components, fillers, formulation additives, etc. in tablets, capsules, dragées, ointments, creams, gels, tinctures and other pharmaceutical forms.

The quality control of the finished product can sometimes even take the form of a non-destructive evaluation, with the products being able to be analysed in their packaging (ampoules, blister packs, bottles), which in turn enables high-grade automation of the output control processes.

With near infra-red spectroscopy being able to be used to define a great many product characteristics, it can, for example, be implemented to monitor formulation processes, such as controlling the homogeneity of emulsions and dispersions. Other possible applications include.

- Measurement of the thickness of tablet coatings
- Automated placebo/verum differentiation
- Classification of plant extracts
- Identification of inartificial fats and oils
- Determining the hardening degree of fats

... amongst others.

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Mills, malt houses, breweries, agriculture and animal feed

Long before the chemical and pharmaceutical industries discovered NIR spectroscopy, the capabilities of this technology in terms of being able to quickly, and sometimes non-destructively analyse samples of an extremely complex composition, such as natural products, were being used intensively by the agricultural industry and its downstream activities. Some examples:

- Fat, water, protein, nitrogen, spelt, starch, crude fibre, oil, glucan, etc. in cereals (wheat, corn, rye, oats, barley...)
- Sugar, fat and moisture content of potato chips
- Alcohol and acidity in vinegar
- Free fatty acids and iodine number in vegetable oils
- Anhydrous mass of dairy produce
- Water content of meat products
- Alcohol and original wort content of beer
- Alcohol content in wine
- Amino acids in seeds
- Caffeine in tea leaves
- Fat and water content in cheese and curd
- Malt extract from malted barley
- Anhydrous mass, raw nutrient content, etc. of organic produce
- Monitoring lactic acid fermentation

... amongst others.

Petrochemicals

One of the most important uses which NIR spectroscopy has found in the petrochemical industry is in the area of octane number determination (RON/MON), and cetane number rating of diesel fuels.

In the processes of refinement, distillation and cracking there is a constant need for methods of online analysis. NIR spectroscopy, when used with a fibre optic connection to the probes, is ideal for use in hazardous areas where there is an explosion risk.

Areas of application include, for example, monitoring fractions, determining aromatic hydrocarbon content in petroleum products and ascertaining quantitative and qualitative operating figures. In many cases it is even possible for gaseous products to be analysed.

Throughout the course of the "life" of a polymer, from its manufacture through to its recycling, NIR spectroscopy can be used to great effect. Below some possible uses:

Polymer analysis

- Incoming control (identity determination/quality control), for example, of raw materials, fillers and additives
- Ascertaining physical attributes, e.g., density and viscosity
- Tracing reactions and controlling processes in a number of polymerisation reactions
- Quantifying the constituent parts of copolymers
- Quality assessment of finished goods
- Accurate separation of polymers for recycling
- Determination of NCO content and viscosity in polyisocyanates
- OH number in polyester, polyol, polyether, etc.

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The chemical industry

The great diversity of products and methods of manufacture in the chemical industry offers a great number of possibilities when it comes to NIR spectroscopy. We have summarised just a few of these possible applications below:

- Quantitative and qualitative inspection of incoming goods
- Determination of active ingredients, secondary components, formulation additives and fillers in pesticides, fungicides and herbicides which can be in the form of a liquid, powder, granulate, paste, emulsion or dispersion
- Determination of various physical and chemical properties, such as:
 - OH number
 - Acid value
 - Iodine number
 - Particle size
 - Peroxide number

... amongst others.

Qualitative and quantitative tracing of reactions and/or end point determination in the following processes:

- Esterification
- Hydrolysis
- Exoxidation
- Hydration
- Hydrogenation

... and many more.

Which improvement would save you the most?

Direct increases in efficiency:

- » Savings on expensive raw materials
- » Reduction of waste level to nil
- » Minimal time invested in production
- » Production of homogenous quality
- » End point determination
- » Personnel savings
- » Product portfolio expansion
- » Less laboratory analysis thanks to real time measurement
- » Reduction of risk to laboratory staff and operatives

Indirect increases in efficiency:

- » Complete traceability and documentation
- » Risk reduction thanks to automation
- » Remote control
- » Image
- » Control of additives their apportionment
- » Non destructive quality assessment

Have we aroused your interest?

Please contact us. We are happy to answer any questions which you may have.

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